

WHAT IS CLAIMED IS:

1. A package substrate to which a conductive connecting pin
5 for establishing the electrical connection with another
substrate is secured, said package substrate comprising:

a pad formed on said substrate and arranged to secure said
conductive connecting pin, wherein

said pad is coated with an organic resin insulating layer,
10 said organic resin insulating layer has an opening through which
said pad is partially exposed to the outside, and

said conductive connecting pin is, through a conductive
adhesive agent, secured to said pad exposed through said opening.

2. A package substrate to which a conductive connecting pin
15 for establishing the electrical connection with another
substrate is secured, said package substrate comprising:

a pad formed on said substrate, arranged to secure said
conductive connecting pin and incorporating a body for securing
said conductive connecting pin and an extension portion formed
20 in the periphery of said body, wherein

said extension portion of said pad is coated with an organic
resin insulating layer, said organic resin insulating layer has
an opening through which said body of said pad is partially exposed
to the outside, and

25 said conductive connecting pin is, through a conductive
adhesive agent, secured to said body of said pad exposed to the
outside through said opening.

3. A package substrate according to claim 1 or 2, wherein
said substrate is a build-up substrate having at least one
30 structure in which a conductor layer and an interlayer resin
insulating layer are alternately laminated.

4. A package substrate according to any one of claims 1 to
3, wherein the diameter of said pad is 1.02 time to 100 times
the diameter of said opening.

35 5. A package substrate incorporating a build-up substrate
having at least one structure in which a conductor layer and

interlayer resin insulating layer are alternately laminated such that a conductive connecting pin for establishing the electrical connection with another substrate is secured to said build-up substrate, said package substrate comprising:

5 a pad for securing said conductive connecting pin is provided for a portion or the overall body of the outermost layer of said build-up, wherein

 said pad is connected to an inner conductor layer through a via hole, and said conductive connecting pin is secured to
10 said pad through a conductive adhesive agent.

6. A package substrate incorporating a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated on the two sides of a core substrate on which a conductor layer
15 is formed such that a conductive connecting pin for establishing the electrical connection with another substrate is secured to said build-up substrate, said package substrate comprising:

 a pad for securing said conductive connecting pin provided for a portion or the overall body of said outermost conductor
20 layer of said build-up substrate, wherein

 said pad is connected to said conductor layer of said core substrate through a via hole, and said conductive connecting pin is secured to said pad through a conductive adhesive agent.

7. A package substrate incorporating a build-up substrate
25 having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated on the two sides of a core substrate in which a through hole having a conductor layer is formed such that a conductive connecting pin for establishing the electrical connected with
30 another substrate is secured to said build-up substrate, said package substrate comprising:

 a pad for securing said conductive connecting pin provided for a portion or the overall body of the outermost conductor layer of said build-up substrate, wherein

35 said pad is connected to said conductor layer of said through hole through a via hole, and said conductive connecting

pin is secured to said pad through a conductive adhesive agent.

8. A package substrate according to any one of claims 5 to 7, wherein said pad is connected to said inner conductor layer through at least one via hole.

5 9. A package substrate according to any one of claims 5 to 8, wherein said pad is connected to said inner conductor layer through a ring-shape via hole.

10. A package substrate according to any one of claims 5 to 9, wherein said pad is connected to said inner conductor layer
10 through a via hole having at least two layers.

11. A package substrate according to any one of claims 5 to 10, wherein said outermost conductor layer is covered with an organic resin insulating layer having an opening through which said pad is partially exposed to the outside, and said conductive
15 connecting pin is, through a conductive adhesive agent, secured to said pad exposed to the outside through said opening.

12. A package substrate according to claim 11, wherein the diameter of said pad is 1.02 time to 100 times the diameter of said opening.

20 13. A package substrate according to any one of claims 1 to 12, wherein said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, and said secured portion is secured to said pad.

14. A package substrate according to any one of claims 1 to
25 13, wherein said conductive adhesive agent has a melting point of 180°C to 280°C.

15. A package substrate according to any one of claims 1 to 14, wherein said conductive adhesive agent is constituted by at least one material selected from tin, lead, antimony, silver,
30 gold and copper.

16. A package substrate according to any one of claims 1 to 15, wherein said conductive adhesive agent is any one of alloys Sn/Pb, Sn/Sb, Sn/Ag and Sn/Sb/Pb.

17. A conductive connecting pin arranged to be secured to a
35 package substrate to establish the electrical connection with another substrate, said conductive connecting pin comprising:

a columnar connection portion and a plate-like secured portion, wherein

5 said conductive connecting pin is made of at least one metal material selected from a group consisting of copper, a copper alloy, tin, zinc, aluminum and noble metal.

18. A conductive connecting pin according to claim 17, wherein said conductive connecting pin is made of phosphor bronze.

19. A package substrate incorporating a substrate which has a conductor layer and a surface to which a conductive connecting
10 pin for establishing the electrical connection with another substrate is secured, said package substrate comprising:

a columnar connection portion and a plate-like secured portion, wherein

15 said conductive connecting pin is made of at least one metal material selected from copper, a copper alloy, tin, zinc, aluminum and noble metal,

a pad for securing said conductive connecting pin is provided for a portion or the overall body of said conductor layer, and

20 said secured portion of said conductive connecting pin is secured to said pad through a conductive adhesive agent.

20. A package substrate according to claim 19, wherein said conductor layer is covered with an organic resin insulating layer having an opening together with said pad is partially exposed
25 to the outside, and said conductive connecting pin is, through a conductive adhesive agent, secured to said pad exposed to the outside through said opening.

21. A package substrate according to claim 20, wherein the diameter of said pad is 1.02 time to 100 times the diameter of
30 said opening.

22. A package substrate according to any one of claims 19 to 21, wherein said substrate is a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated.

35 23. A package substrate comprising: a build-up substrate having at least one structure in which a conductor layer and

an interlayer resin insulating layer are alternately laminated such that a conductive connecting pin for establishing the electrical connection with another substrate is secured to said build-up substrate, wherein

5 said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, said conductive connecting pin is made of at least one metal material selected from copper, a copper alloy, tin, zinc, aluminum and noble metal,

10 a pad for securing said conductive connecting pin is provided for a portion or the overall body of said outermost conductor layer of said build-up substrate,

 said pad is connected to the inner conductor layer through a via hole, and said conductive connecting pin is connected to
15 said pad through a conductive adhesive agent.

24. A package substrate comprising: a build-up substrate which a conductor layer and an interlayer resin insulating layer are alternately laminated on the two sides of a core substrate having said conductor layer formed thereon such that a conductive
20 connecting pin for establishing the electrical connection with another substrate is secured to said build-up substrate, wherein

 said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, said conductive connecting pin is made of at least one metal material
25 selected from copper, a copper alloy, tin, zinc, aluminum and noble metal,

 a pad for securing said conductive connecting pin is provided for a portion or the overall body of the outermost conductor layer of said build-up substrate,

30 said pad is connected to said conductor layer of said core substrate through a via hole, and said conductive connecting pin is secured to said pad through a conductive adhesive agent.

25. A package substrate comprising: a build-up substrate having at least one structure in which a conductor layer and
35 interlayer resin insulating layer are alternately laminated on the two sides of a core substrate in which a through hole having

a conductor layer is formed such that a conductive connecting pin for establishing the electrical connection with another substrate is secured to said build-up substrate, wherein

5 said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, said conductive connecting pin is made of at least one metal material selected from copper, a copper alloy, tin, zinc, aluminum and noble metal,

10 a pad for securing said conductive connecting pin is provided for a portion or the overall body of the outermost conductor layer of said build-up substrate,

15 said pad is connected to said conductor layer of said conductor layer of said through hole through a via hole, and said conductive connecting pin is secured to said pad through a conductive adhesive agent.

26. A package substrate according to any one of claims 23 to 25, wherein said pad is connected to the inner conductor layer through at least one via hole.

20 27. A package substrate according to any one of claims 23 to 26, wherein said pad is connected to the inner conductor layer through a ring-shape via hole.

28. A package substrate according to any one of claims 23 to 27, wherein said pad is connected to the inner conductor layer through a via hole formed into at least two layers.

25 29. A package substrate according to any one of claims 23 to 28, wherein said outermost conductor layer is covered with an organic resin insulating layer having an opening together with said pad is partially exposed to the outside, said conductive connecting pin is, through a conductive adhesive agent, secured to said pad exposed to the outside through said opening.

30 30. A package substrate according to claim 28, wherein the diameter of said pad is 1.02 time to 100 times the diameter of said opening.

35 31. A package substrate according to any one of claims 23 to 30, wherein said conductive connecting pin is made of phosphor bronze.

32. A package substrate according to any one of claims 19 to 31, wherein the melting point of said conductive adhesive agent is 180°C to 280°C.

33. A package substrate according to any one of claims 19 to 32, wherein said conductive adhesive agent is made of at least one material selected from tin, lead, antimony, silver, gold and copper.

34. A package substrate according to any one of claims 19 to 33, wherein said conductive adhesive agent is made of any one of alloys Sn/Pb, Sn/Sb, Sn/Ag and Sn/Sb/Pb.

35. A conductive connecting pin arranged to be secured to a package substrate to establish the electrical connection with another substrate, said conductive connecting pin comprising:

a columnar connection portion and a plate-like secured portion, wherein said columnar connection portion has a constriction portion having a diameter which is smaller than the diameter of the other portions.

36. A conductive connecting pin according to claim 35, wherein the diameter of said constriction portion is not less than 50 % nor more than 98 % of the diameter of the other portions.

37. A package substrate comprising: a substrate having a conductor layer; and a conductive connecting pin arranged to establish the electrical connection with another substrate and secured to said substrate, wherein

said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, a constriction portion having a diameter which is smaller than the diameter of the other portions is provided for said columnar connection portion,

a pad for securing said conductive connecting pin is provided for a portion or the overall body of said conductor layer, and

said secured portion of said conductive connecting pin is secured to said pad through a conductive adhesive agent.

38. A package substrate according to claim 37, wherein said conductor layer is covered with an organic resin insulating layer

having an opening together with said pad is partially exposed to the outside, and said conductive connecting pin is, through a conductive adhesive agent, secured to said pad exposed to the outside through said opening.

5 39. A package substrate according to claim 38, wherein the diameter of said pad is 1.02 time to 100 times of said opening.

40. A package substrate according to any one of claims 37 to 39, wherein said substrate is a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated.

10 41. A package substrate comprising: a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated; and a conductive connecting pin arranged to establish the electrical connection with another substrate and secured to said build-up substrate, wherein

15 said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, a constriction portion having a diameter which is smaller than the diameter of the other portions is provided for said columnar connection organic resin insulating layer,

20 a pad for securing said conductive connecting pin is provided for a portion or the overall body of said outermost conductor layer of said build-up substrate,

25 said pad is connected to the inner conductor layer through a via hole, and said conductive connecting pin is secured to said pad through a conductive adhesive agent.

42. A package substrate comprising: a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated on the two sides of a core substrate having a conductor layer formed thereon; and a conductive connecting pin arranged to establish the electrical connection with another substrate and secured to said build-up substrate, wherein

30 said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, a

constriction portion having a diameter which is smaller than the diameter of the other portions is provided for said columnar connection portion,

5 a pad for securing said conductive connecting pin is provided for a portion or the overall body of the outermost conductor layer of said build-up substrate,

said pad is connected to said conductor layer of said core substrate through a via hole, and said conductive connecting pin is secured to said pad through a conductive adhesive agent.

10 43. A package substrate comprising: a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated on the two sides of a core substrate having a through hole incorporate a conductor layer; and a conductive connecting pin
15 arranged to establish the electrical connection with another substrate and secured to said build-up substrate, wherein

said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, a constriction portion having a diameter which is smaller than
20 the diameter of the other portions is provided for said columnar connection portion,

a pad for securing said conductive connecting pin is provided for a portion or the overall body of the outermost conductor layer of said build-up substrate,

25 said pad is connected to said conductor layer of said through hole through a via hole, and said conductive connecting pin is secured to said pad through a conductive adhesive agent.

44. A package substrate according to any one of claims 41 to 43, wherein said pad is connected to the inner conductor layer
30 through at least one via hole.

45. A package substrate according to any one of claims 41 to 44, wherein said pad is connected to the inner conductor layer through a ring-shape via hole.

46. A package substrate according to any one of claims 41 to
35 45, wherein said pad is connected to the inner conductor layer through a via hole formed into at least two layers.

47. A package substrate according to any one of claims 41 to 46, wherein the outermost conductor layer is covered with an organic resin insulating layer having an opening together with said pad is partially exposed to the outside, and said conductive
5 connecting pin is, through a conductive adhesive agent, secured to said pad exposed to the outside through said opening.

48. A package substrate according to claim 46, wherein the diameter of said pad is 1.02 time to 100 times the diameter of said opening.

10 49. A package substrate according to any one of claims 41 to 48, wherein said conductive connecting pin is made of phosphor bronze.

50. A package substrate according to any one of claims 37 to 49, wherein said conductive adhesive agent has a melting point
15 of 180°C to 280°C.

51. A package substrate according to any one of claims 37 to 50, wherein said conductive adhesive agent is made of at least one material selected from tin, lead, antimony, silver, gold and copper.

20 52. A package substrate according to any one of claims 37 to 51, wherein said conductive adhesive agent is made of any one of alloys Sn/Pb, Sn/Sb, Sn/Ag and Sn/Sb/Pb.

53. A package substrate comprising:

25 a plane layer which is a conductor layer formed on the surface of a substrate;

an organic resin insulating layer formed on the surface of said plane layer and having an opening; and

30 a conductive connecting pin secured to said plane layer exposed to the outside through said opening of said organic resin insulating layer, said conductive connecting pin being secured through a conductive adhesive agent.

54. A package substrate comprising:

a plane layer formed on the surface of a substrate;

a pad formed on the surface of said substrate;

35 an organic resin insulating layer formed on the surfaces of said plane layer and said pad and having an opening; and

a conductive connecting pin secured to said plane layer and said pad exposed to the outside through said opening of said organic resin insulating layer, said conductive connecting pin being secured through a conductive adhesive agent.

5 55. A package substrate according to claim 53 or 54, wherein said substrate is a build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated.

10 56. A package substrate according to claim 54 or 55, wherein the periphery of said pad is covered with said organic resin insulating layer.

15 57. A package substrate according to any one of claims 53 to 56, wherein said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, and said conductive connecting pin is made of at least one metal material selected from copper, a copper alloy, tin, zinc, aluminum and noble metal.

20 58. A package substrate according to any one of claims 53 to 56, wherein said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, and a constriction portion having a diameter which is smaller than the diameter of the other portions is provided for said columnar connection portion.

25 59. A package substrate according to any one of claims 53 to 58, wherein said conductive adhesive agent has a melting point of 180°C to 280°C.

30 60. A package substrate according to any one of claims 53 to 56, wherein said conductive adhesive agent is made of at least one material selected from tin, lead, antimony, silver, gold and copper.

61. A package substrate according to any one of claims 53 to 60, wherein said conductive adhesive agent is any one of alloys Sn/Pb, Sn/Sb, Sn/Ag and Sn/Sb/Pb.

35 62. A package substrate incorporating a substrate having a conductor circuit, an organic resin insulating layer formed on said substrate and an opening is formed in said organic resin

insulating layer so that a portion of said conductor circuit is exposed to the outside, said package substrate comprising:

5 a projecting pin disposed in said opening and arranged to be inserted into a connection portion of an external substrate to which said package substrate is connected, wherein
said projecting pin and said conductor circuit are joined to each other through a conductive adhesive layer.

63. A package substrate incorporating a substrate having a conductor circuit, an organic resin insulating layer formed on
10 said substrate and an opening is formed in said organic resin insulating layer so that a portion of said conductor circuit is exposed to the outside, said package substrate comprising:

a projecting pin disposed in said opening and arranged to be inserted into a connection portion of an external substrate
15 to which said package substrate is connected, wherein
said projecting pin and said conductor circuit are joined to each other through a metal layer and a conductive adhesive layer.

64. A package substrate incorporating a substrate having a conductor circuit, an organic resin insulating layer formed on
20 said substrate and an opening is formed in said organic resin insulating layer so that a portion of said conductor circuit is exposed to the outside, said package substrate comprising:

a recess formed around said opening;
25 a projecting pin which is inserted into a connection portion of an external substrate to which said package substrate is connected, wherein said projecting pin is engaged to said recess, and said projecting pin and said conductor circuit are joined to each other through a conductive adhesive layer.

30 65. A package substrate incorporating a substrate having a conductor circuit, an organic resin insulating layer formed on said substrate and an opening is formed in said organic resin insulating layer so that a portion of said conductor circuit is exposed to the outside, said package substrate comprising:

35 a recess formed around said opening;
a projecting pin which is inserted into a connection

portion of an external substrate to which said package substrate is connected, wherein said projecting pin is engaged to said recess, and said projecting pin and said conductor circuit are joined to each other through a metal layer and a conductive adhesive layer.

66. A package substrate according to any one of claims 62 to 65, wherein the diameter of said opening is $100\mu\text{m}$ to $900\mu\text{m}$.

67. A package substrate according to claim 64 or 65, wherein the diameter of said recess formed around said opening is $10\mu\text{m}$ to $75\mu\text{m}$, and two or more recesses are provided.

68. A package substrate according to any one of claims 64, 65 or 67, wherein the depth of said recess formed around said opening is $1\mu\text{m}$ to $30\mu\text{m}$.

69. A package substrate according to any one of claims 62 to 68, wherein said opening and said recess formed around said opening are formed by photovia, laser, drill or punching.

70. A package substrate according to any one of claims 62 to 69, wherein said conductive adhesive layer is made of at least one material selected from solder, a brazing material, conductive granular substances and thermoplastic resin and conductive granular substances and thermosetting resin.

71. A package substrate according to claim 70, wherein the mixture ratio of Pb in the solder is 35 % to 97 %.

72. A package substrate according to claim 70, wherein the solder is one of Sn/Pb, Sn/Sb, Sn/Ag or Sn/Ag/Cu.

73. A package substrate according to claim 70, wherein said brazing material is made of at least one material selected from gold silver, copper, phosphorus, nickel, palladium, zinc, indium, molybdenum and manganese.

74. A package substrate according to claim 70, wherein said granular substances are constituted by at least one type of a material selected from metal particles, inorganic particles and resin particles.

75. A package substrate according to claim 70 or 74, wherein the filling factor of said conductive granular substances is

30 wt% to 90 wt%.

76. A package substrate according to any one of claims 70, 74 and 75, wherein said thermosetting resin is at least any one of epoxy resin, polyimide resin, polyester resin and phenol resin.

77. A package substrate according to any one of claims 70 and 74 to 76, wherein said thermoplastic resin is at least any one of epoxy resin, fluorine-resin polyethylene, polysulfon resin, polyimide resin, polyether resin and polyolefin resin.

78. A package substrate according to any one of claims 70 to 77, wherein said conductive adhesive layer is formed by any one of printing, a resist etching method, potting and plating.

79. A package substrate according to any one of claims 62 to 65, wherein at least a portion of said projecting pin is made of metal.

80. A package substrate according to any one of claims 62 to 65 and 79, wherein said projecting pin is made of at least one type of a material selected from gold, silver, iron, copper, nickel, cobalt, tin and lead.

81. A package substrate according to any one of claims 62 to 65, 79 and 80, wherein the bonding surface of said projecting pin is 0.5 time to 1.4 time the area of said opening.

82. A package substrate according to any one of claims 62 to 65 and 79 to 81, wherein the bonding surface of said projecting pin is formed into a flat shape or formed to have two or more projections.

83. A package substrate according to claim 63 or 65, wherein said metal layer is made of at least one material selected from gold, silver, nickel, tin, copper, aluminum, lead, phosphorus, chrome, tungsten, molybdenum, titanium, platinum and solder, and said metal layer is constituted by one or more layers.

84. A package substrate according to any one of claims 63, 65 and 83, wherein said metal layer is formed by any one of a method selected from plating, sputtering and evaporating.

85. A package substrate comprising: a substrate having a conductor circuit; an organic resin insulating layer formed on

said substrate; an opening formed in said organic resin insulating layer so that a portion of said conductor circuit is exposed to the outside; and a pin disposed on said conductor circuit of said opening so that said package substrate is
5 connected to a connection portion of an external substrate, wherein

said pin is formed into a projecting pin which can be engaged, and said pin is engaged and connected to said connection portion of said external substrate.

10 86. A package substrate according to claim 85, wherein said projecting pin is electrically connected to said conductor circuit exposed over said opening through a conductive adhesive layer or a metal layer and a conductive adhesive layer.

15 87. A package substrate incorporating a substrate provided with a conductor circuit, an organic resin insulating layer formed on said substrate and an opening formed in said organic resin insulating layer so that a portion of said conductor circuit is exposed to the outside, said package substrate comprising:

20 a projecting pin provided for said opening and arranged to be inserted into a connection portion of an external substrate to which said package substrate is connected, wherein

said projecting pin and said conductor circuit are joined to each other through a conductive adhesive layer.

25 88. A package substrate incorporating a substrate provided with a conductor circuit, an organic resin insulating layer formed on said substrate and an opening formed in said organic resin insulating layer so that a portion of said conductor circuit is exposed to the outside, said package substrate comprising:

30 a projecting pin provided for said opening and arranged to be inserted into a connection portion of an external substrate to which said package substrate is connected, wherein

said projecting pin and said conductor circuit are joined to each other through a metal layer and a conductive adhesive layer.

35 89. A package substrate according to any one of claims 62 to 88, wherein a projection for establishing the connection with

said conductor circuit is provided for the reverse side of said projecting pin.